

GENERAL INSTRUMENT CORPORATION

RADIO RECEPTOR DIVISION
100 Andrews Road
Hicksville, Long Island, N.Y.

MAGNETOSTRICTIVE DELAY LINES

ECONOMICAL . . . Magnetostriuctive delay lines are lower in initial cost and require less auxiliary circuitry. Lower power consumption.

FAST Bit rates in excess of 2 megacycles are readily accommodated with conventional magnetostriuctive delay lines. Access times depend on storage capacity.

FLEXIBLE . . . Delay line manufacturing techniques offer users a continuous range of bit capacities from 1 bit to tens of thousands in a single unit. Operation can be synchronized with system clocks.

DEPENDABLE . . . Absence of wearing parts gives delay lines unlimited life without maintenance. They are ready for use instantaneously without warmup or startup time.

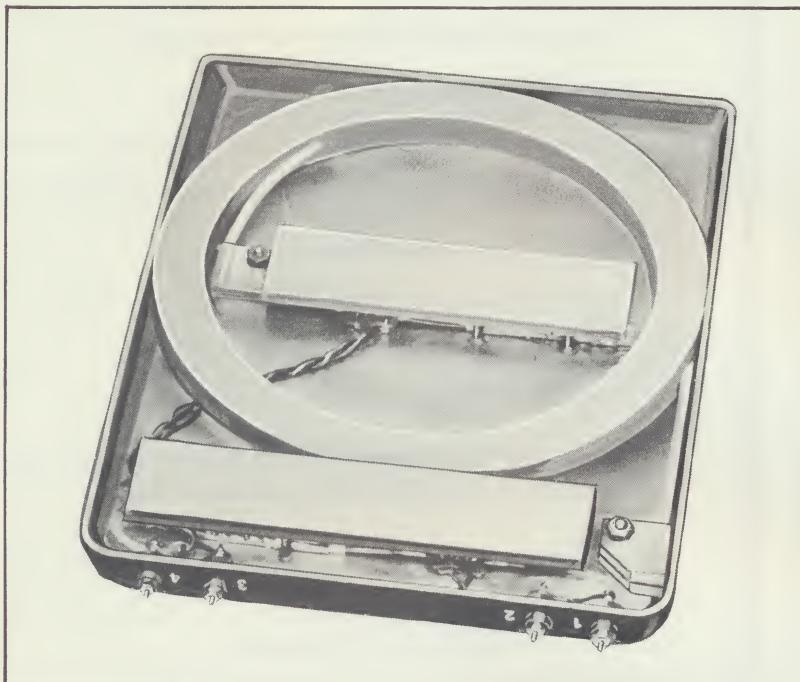
ADAPTABLE . . . Delay lines can be adapted to a wide variety of digital and analog applications over a wide range of environmental conditions. Modern packaging techniques provide compactness with extreme form factor flexibility.

EXPANDABLE . . . Memory systems are readily expanded by adding more delay line elements. A number of lines may be operated in parallel, or "corner turners" applied where word parallel operation is desired.

AVAILABLE . . . Fast deliveries, with or without electronics, can be offered and fulfilled. Even special prototypes can be produced quickly and economically. Production costs are extremely low for quantity orders.



HIGH FREQUENCY MAGNETOSTRICTIVE DELAY LINES



HTDL Series **Torsional Mode**

DELAY RANGE:
60 to 1500 microseconds

Unique high frequency magnetostrictive delay lines, capable of "storing" twice the amount of digital information handled by any comparable devices of their type, are now available for aerospace and other critical military and commercial applications.

- Operating frequencies to 4.0 mc in the NRZ mode
- Digital serial memory to 6,000 bits

The cost of the HTDL is as much as 75% less than a comparable quartz or glass unit.

DATA SHEET DL404-64

DIVISIONS AND SUBSIDIARIES OF GENERAL INSTRUMENT CORPORATION INCLUDE: RADIO RECEPTOR COMPANY, INC. / HARRIS ASW DIVISION / F. W. SICKLES DIVISION
ADVANCED DEVELOPMENT LABORATORY, EAST AND WEST COAST DIVISIONS / AUTOMATIC MANUFACTURING DIVISION / THERMOELECTRIC DIVISION / MAGNEHEAD
DIVISION / SYSTEMATICS DIVISION / G.I.-F. W. SICKLES OF CANADA, LTD. / APPLIED RESEARCH LABORATORY / SEMICONDUCTOR DIVISION / CAPACITOR DIVISION

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Custom Manufactured Delay Lines

We are prepared to engineer and manufacture delay lines to meet exacting specific requirements.

Write giving your specifications for firm quotations.



GENERAL INSTRUMENT CORPORATION
DEFENSE AND ENGINEERING PRODUCTS GROUP

SPECIFICATIONS (General)

- **Delay Range:** Nominal 60 to 1500 microseconds
- **Adjustment:** To 4 microseconds
- **Encapsulated**
- **Tolerance On Nominal Delay:** ± 50 nanoseconds
- **Temperature Range:** -25° to $+100^\circ\text{C}$
- **Temperature Coefficient of Delay:** Less than 1 part /million/ $^\circ\text{C}$.
- **Insertion Loss:** 50 to 60 db—with Read-Write Amplifiers 1:1
- **Signal to Noise Ratio:** Greater than 10:1
- **Output Z:** Available from 2000 ohms
- **I In:** ≥ 50 ma

Operating frequencies up to 5 mc can be attained in lines of 10 to 60 microseconds in length.

MIL

Vibration: 55 to 500 cps at 15g.
5 to 55 cps at .06" excursion

Shock: 80g for 11 milliseconds

Finish: Baked Gray Enamel. MIL-E-15090. Other finishes available

Durability: 90 HR Salt Spray

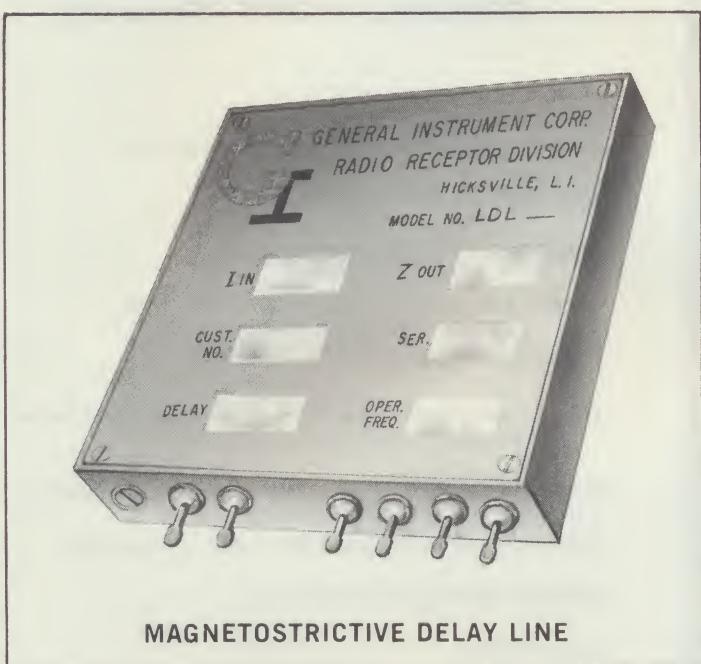
Hermetically Sealed

APPLICATIONS

- Radar Simulators
- Telemetering Systems
- Missiles and Aircraft
- Computers
- Navigational Systems



ULTRASONIC DELAY LINES



**GENERAL
INSTRUMENT
MAGLINE**

LDL Series
Longitudinal Mode

DELAY RANGE:
10 to 1000 μ sec

FEATURES

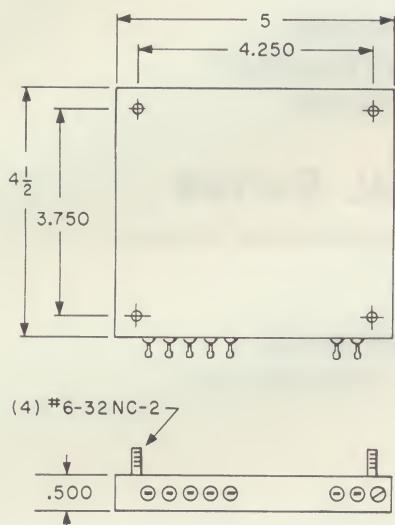
- Small—Light Weight
- Wide Delay Ranges
- Excellent Shock and Vibration Characteristics
- Dust Proof—Sealed
- Low Temp. Coefficient of Delay
- High Ratio of Delay to Pulse Rise Time
- Adjustable
- High Signal to Noise Ratios
- To Mil or Commercial Specifications

APPLICATIONS

- Computers
- Coders and Decoders
- Telemetering Systems
- Navigational Systems
- Radar Simulators
- Missiles and Aircraft

LDL Series

TYPICAL PACKAGE



Custom Manufactured Delay Lines

We are prepared to engineer and manufacture delay lines to meet exacting specific requirements.

Write giving your specifications for firm quotations.

SPECIFICATIONS (General)

Delay Range: Nominal 10 to 1000 microseconds

Adjustment: To 8 microseconds

Taps: Available to suit specifications

Tolerance On Nominal Delay: ± 50 nanoseconds

Temperature Range: -25° to $+100^\circ\text{C}$

Temperature Coefficient of Delay: Less than 2 parts/million/ $^\circ\text{C}$. Lower values on request.

Insertion Loss: 40 to 60 db—with Read-Write Amplifiers 1:1

Signal to Noise Ratio: Greater than 10:1 without taps

Output Z: Available from 2000 ohms

I In: ≥ 50 ma

Carrier Frequency: 100 kc to 1 mc

Ratio of Delay to Pulse Rise Time: 800:1

MIL

Vibration: 55 to 500 cps at 15g.
5 to 55 cps at .06" excursion

Shock: 50g for 11 milliseconds

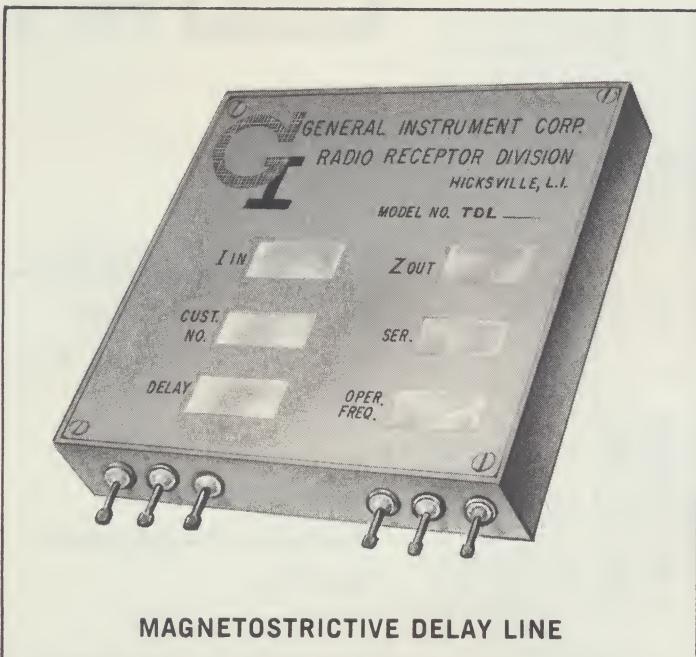
Finish: Baked Gray Enamel. MIL-E-15090. Other finishes available

Durability: 90 HR Salt Spray

Hermetically Sealed



ULTRASONIC DELAY LINES



**GENERAL
INSTRUMENT
MAGLINE**

TDL Series
Torsional Mode

DELAY RANGE:
1 to 15 Milliseconds

FEATURES

- Small—Light Weight
- Wide Delay Ranges
- Excellent Shock and Vibration Characteristics
- Dust Proof—Sealed
- Low Temp. Coefficient of Delay
- High Ratio of Delay to Pulse Rise Time
- Adjustable
- High Signal to Noise Ratios
- To Mil or Commercial Specifications

APPLICATIONS

- Computers
- Coders and Decoders
- Telemetering Systems
- Navigational Systems
- Radar Simulators
- Missiles and Aircraft

| MODEL | TDL-10 | TDL-15 | TDL-20 | TDL-25 | TDL-30 | TDL-35 | TDL-46 | TDL-50 | TDL-70 | TDL-100 | TDL-150 |
|-----------------------|--|---|---|---|---|---------------------------------|---------------------------------|---------------------------------|---------------------------------|-----------------------------------|-------------------------|
| DELAY | 1 MS | 1.5 MS | 2 MS | 2.5 MS | 3 MS | 3.5 MS | 4.6 MS | 5 MS | 7 MS | 10 MS | 15 MS |
| ADJUST RANGE | $\pm 2\mu s$ | $\pm 2\mu s$ | $\pm 2\mu s$ | $\pm 2\mu s$ | $\pm 2\mu s$ | $\pm 2\mu s$ | $\pm 2\mu s$ | $\pm 2\mu s$ | $\pm 2\mu s$ | $\pm 2\mu s$ | $\pm 3\mu s$ |
| CASE SIZE | $3\frac{1}{2} \times 4 \times \frac{1}{2}$ | $4\frac{1}{4} \times 4\frac{7}{8} \times \frac{1}{2}$ | $4\frac{1}{4} \times 4\frac{7}{8} \times \frac{3}{4}$ | $4\frac{1}{2} \times 4\frac{7}{8} \times \frac{3}{4}$ | $5\frac{1}{4} \times 5\frac{1}{4} \times \frac{7}{8}$ | $6 \times 6 \times \frac{1}{2}$ | $6 \times 7 \times \frac{3}{4}$ | $6 \times 7 \times \frac{3}{4}$ | $9 \times 9 \times \frac{3}{4}$ | $10 \times 10 \times \frac{3}{4}$ | $10 \times 10 \times 1$ |
| BIT STORAGE (RZ TYPE) | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4600 | 5000 | 7000 | 10,000 | 11,250 |
| REP. FREQUENCY | 0-1 MC | 0-1 MC | 0-1 MC | 0-1 MC | 0-1 MC | 0-1 MC | 0-1 MC | 0-1 MC | 0-1 MC | 0-1 MC | 0-75 MC |
| E IN | 20V. | 20V. | 20V. | 20V. | 25V. | 25V. | 25V. | 25V. | 28V. | 28V. | 28V. |
| I IN | 55 MA | 55 MA | 55 MA | 55 MA | 65 MA | 65 MA | 65 MA | 65 MA | 80 MA | 80 MA | 80 MA |
| Z IN | 500Ω | 500Ω | 500Ω | 500Ω | 500Ω | 500Ω | 500Ω | 500Ω | 500Ω | 500Ω | 500Ω |
| INPUT PULSE WIDTH | .45μs | .45μs | .45μs | .45μs | .45μs | .45μs | .45μs | .45μs | .40μs | .40μs | .40μs |
| ," RISE TIME μs | .03 | .03 | .03 | .03 | .03 | .03 | .025 | .025 | .025 | .025 | .025 |
| ," FALL TIME μs | .05 | .05 | .05 | .05 | .05 | .05 | .05 | .05 | .05 | .05 | .05 |
| E OUT | 20 MV. | 20 MV. | 15 MV. | 15 MV. | 15 MV. | 15 MV. | 15 MV. | 15 MV. | 10 MV. | 5 MV. | 3 MV. |
| Z OUT Ω | 1500 | 1500 | 1500 | 2000 | 2000 | 2000 | 3000 | 3000 | 3500 | 4000 | 4000 |
| OUTPUT PULSE WIDTH μs | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| SIG./NOISE (STATIC) | 50:1 | 50:1 | 50:1 | 50:1 | 50:1 | 50:1 | 50:1 | 40:1 | 40:1 | 30:1 | 30:1 |
| SIG./NOISE (DYNAMIC) | 25:1 | 25:1 | 25:1 | 25:1 | 25:1 | 25:1 | 25:1 | 20:1 | 20:1 | 15:1 | 15:1 |



TDL Series

MIL SPEC.

Hermetically Sealed

Vibration: 55 to 500 cps at 15g
5 to 55 cps at .06" excursion

Shock: 50g for 11 milliseconds

Durability: 90 HR Salt Spray

Finish: MIL-E-15090

Other Electrical and
Mechanical Configurations
Available.

Custom Manufactured Delay Lines

We are prepared to engineer and manufacture delay lines to meet exacting specific requirements.

The G.I. Encapsulation Story

The encapsulation techniques developed at G.I. have made a major breakthrough in filling industry's needs for high shock, vibration and thermal requirements. The entire delay media package is encapsulated in silicone rubber in such a manner that no additional insertion losses are incurred over non encapsulated lines. The techniques and processes are proprietary to G.I. and are offered at no additional cost to you.

PAT. PEND.

SCRIBBLE HERE.



MLDL Series

SPECIFICATIONS (General)

Delay Range: Nominal to 10 to 1000 microseconds

Tolerance On Nominal Delay: ± 50 nanoseconds

Temperature Range: -55° to $+100^\circ\text{C}$

Temperature Coefficient of Delay: Less than 20 parts/million/ $^\circ\text{C}$. Lower values on request.

Insertion Loss: 40 to 60 db—with Read-Write Amplifiers 1:1

Signal to Noise Ratio: Greater than 5:1 without taps

Output Z: Available from 2000 ohms

I In: ≥ 50 ma

Carrier Frequency: 100 kc to 1 mc

Ratio of Delay to Pulse Rise Time: 800:1

MIL

Vibration: 55 to 500 cps at 15g.
5 to 55 cps at .06" excursion

Shock: 50g for 11 milliseconds

Finish: Baked Gray Enamel. MIL-E-15090. Other finishes available

Durability: 90 HR Salt Spray

Hermetically Sealed

Custom Manufactured Delay Lines

We are prepared to engineer and manufacture delay lines to meet exacting specific requirements.

Write giving your specifications for firm quotations.

Case Size: $2\frac{3}{16} \times 3\frac{7}{8} \times \frac{7}{16}$ "



ULTRASONIC DELAY LINES

GENERAL INSTRUMENT MAGLINE

SLDL Series *Longitudinal Mode*

DELAY RANGE:
150 to 500 μ sec

FEATURES

- Attenuation 30 db Max.
- Encapsulated
- Requires No Input Power
- Push Pull Techniques
- Dynamic Signal to Noise Ratio 20:1 Min.
- Small — Light Weight
- Dust Proof — Sealed
- To Mil or Commercial Specifications
- High Ratio of Delay to Pulse Rise Time



MAGNETOSTRICTIVE DELAY LINE

TYPICAL PACKAGE

INPUT:

E_{IN} — 25 V.
 I_{IN} — 100 ma
 P_W — .8 μ /sec.
 P_{RF} — 40 kc min.
 T_R — 50 nano/sec.

OUTPUT:

E_{OUT} — 3.2 Volts
 P_W — .8 μ /sec. @ 50% Amp.
 T_R — 250 nano/sec.
 T_O — 78 μ /sec.

SIZE:

5 x 4 x .75"

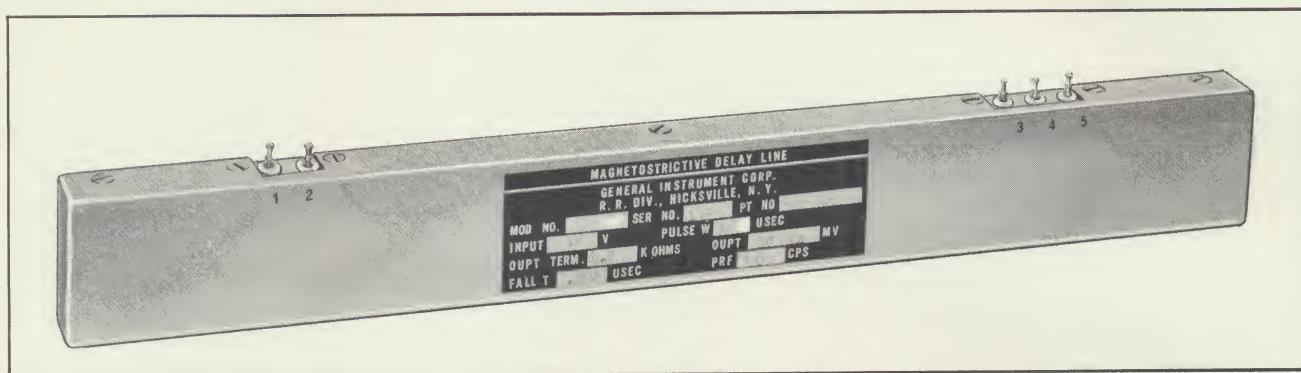
APPLICATIONS

- Radar Simulators • Telemetering Systems • Missiles and Aircraft • Coders and Decoders • Navigational Systems

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ULTRASONIC DELAY LINES



XLDL Series

Longitudinal Mode

DELAY RANGE:
to 50 microseconds

- Delay Adjustment:
Continuously variable from 0.8 microseconds to maximum delay

- Electronics available in same package
- To Mil or Commercial Specifications
- Other Electrical and Mechanical Configurations available
- Operating frequencies to 4.0 mc in the NRZ mode

800 NANO SECONDS!!

Lower values on request.

APPLICATIONS

- Computers
- Coders and Decoders
- Telemetering Systems
- Navigational Systems
- Radar Simulators
- Missiles and Aircraft

FEATURES

- Small—Light Weight
- Wide Delay Ranges
- Dust Proof—Sealed
- Low Temp. Coefficient of Delay
- Excellent Shock and Vibration Characteristics
- High Signal to Noise Ratios
- High Ratio of Delay to Pulse Rise Time